Amendments to the claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for transmitting signals from a plurality of antennae at a transmitting unit to a receiving unit, the method comprising the steps of:

(a) generating a plurality of sinusoidal radio carriers corresponding to each of the plurality of antennae;

(b) modulating the plurality of sinusoidal radio carriers with a modulating signal;

(c) during a first time period, adjusting ~~the~~ amplitude and phase of the plurality of radio carrier signals corresponding to the plurality of antennae according to a ~~the~~ magnitude and angle of a ~~the~~ corresponding element of a first test weight vector, w_{test1}, comprised of one complex element for each antenna of the transmitting unit;

(d) creating radio waves by transmitting the plurality of radio carrier signals, as adjusted according to the preceding step and as modulated by the modulating signal, from the corresponding plurality of antennae;

(e) during a second time period that does not overlap with the first time period, adjusting the amplitude and phase of the plurality of radio carrier signals of a ~~the~~ test signal corresponding to the plurality of antennae according to a ~~the~~ magnitude and angle of a ~~the~~ corresponding element of a second test weight vector, w_{test2}, comprised of one complex element for each antenna of the transmitting unit, wherein the second test weight vector is different from the first test weight vector;

(f) creating radio waves by transmitting the plurality of radio carrier signals, as adjusted according to the preceding step and as modulated by the modulating signal, from the corresponding plurality of antennae; and

(g) generating a new weight vector, w_{new}, based upon feedback received from the receiving unit, wherein the new weight vector is a function of the first and second test weight vectors.

2. (Currently Amended) The method according to claim 1 further comprising the steps of:

(h) adjusting the amplitude and phase of the plurality of radio carrier signals corresponding to the plurality of antennae according to a ~~the~~ magnitude and angle of a ~~the~~ corresponding element of the new weight vector;

(i) creating radio waves by transmitting the plurality of radio carrier signals, as adjusted according to the preceding step and as modulated by the modulating signal, from the corresponding plurality of antennae.

3. (Original) The method according to claim 1 wherein the first and second test vectors, $\mathbf{w}_{test1}$ and $\mathbf{w}_{test2}$, are generated as normalized vectors, such that $\|\mathbf{w}_{test1}\| = \|\mathbf{w}_{test2}\|$.

4. (Currently Amended) The method according to claim 3 wherein the norm applied to the first and second test vectors is the 2-norm, said two norm being defined as $\|\mathbf{a}\| = \sqrt{\sum_{\forall k} |a_k|^2}$, such that a ~~the~~ summation of ~~the~~ powers of ~~the~~ waveforms generated at the plurality of antennae is the same for ~~the~~ application of both first and second test weight vectors.

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5. (Original) The method according to claim 3 wherein the first and second test vectors, $\mathbf{w}_{test1}$ and $\mathbf{w}_{test2}$, are generated as functions of a first base weight vector $\mathbf{w}_{base1}$, where said base weight vector is comprised of one complex element for each antenna of the transmitting unit.

6. (Original) The method according to claim 5 wherein the first and second test vectors, $\mathbf{w}_{test1}$ and $\mathbf{w}_{test2}$, are generated as perturbations from the first base weight vector $\mathbf{w}_{base1}$, so that $\mathbf{w}_{test1} = A\frac{\mathbf{w}_{base1} + \mathbf{p}_1}{\|\mathbf{w}_{base1} + \mathbf{p}_1\|}$ and $\mathbf{w}_{test2} = A\frac{\mathbf{w}_{base1} + \mathbf{p}_2}{\|\mathbf{w}_{base1} + \mathbf{p}_2\|}$, where first perturbation vector $\mathbf{p}_1$ and second perturbation vector $\mathbf{p}_2$ are comprised of one complex element for each antenna of the transmit unit and where scaling factor A is the same for both first and second test weight vector.

7. (Currently Amended) The method according to claim 6 wherein the second perturbation vector is ~~the~~ inverse to ~~of~~ the first perturbation vector, so that $\mathbf{p}_2 = -\mathbf{p}_1$.

8. (Original) The method according to claim 6 wherein the second perturbation vector is set to zero and the first perturbation vector is non-zero.

9. (Original) The method according to claim 6 wherein the second perturbation vector is generated in the same manner as the first perturbation vector, and is generated independently of the first perturbation vector.

10. (Currently Amended) The method according to claim 6 wherein the first perturbation is generated as a ~~the~~ product of a perturbation magnitude scalar β_2 and a perturbation direction vector **v**, where the perturbation direction vector **v** has a fixed average norm *B*, so that $mean(\|\mathbf{v}\|) = B$ and $\mathbf{p}_1 = \beta_2\mathbf{v}$.

11. (Original) The method according to claim 10 wherein the perturbation direction vector **v** is generated pseudo-randomly.

12. (Original) The method according to claim 10 wherein the norm used for the perturbation direction vector **v** is the 2-norm.

13. (Currently Amended) The method according to claim 11 wherein the elements of the perturbation direction vector are uncorrelated~~, so that~~ $\cancel{mean(\mathbf{v}\mathbf{v}^H) = mean(\|\mathbf{v}\|_2)\mathbf{I}}$~~, where~~ $\cancel{\|\mathbf{v}\|_2}$ ~~is the 2-norm of the perturbation direction vector **v** and **I** is the identity matrix~~.

14. (Currently Amended) The method according to claim 11 wherein each element of the perturbation direction vector is pseudo-randomly selected from a ~~the~~ set {C·(+1+j), C·(+1-j), C·(-1+j), C·(-1-j)}, such that $\mathbf{v} = C \cdot \begin{bmatrix} \pm 1 \pm j \\ \dots \\ \pm 1 \pm j \end{bmatrix}$, where j represents a ~~the~~ unit magnitude imaginary number, and the scalar *C* determines an ~~the~~ amplitude of the vector.

15. (Original) The method according to claim 11 wherein each element of the perturbation direction vector is pseudo-randomly generated as a complex normally distributed variable.

16. (Original) The method according to claim 1 wherein the first period of time is comprised of a plurality of non-contiguous time slots.

17. (Original) The method according to claim 1 wherein the second period of time is comprised of a plurality of non-contiguous time slots.

18. (Original) The method according to claim 16 wherein the second period of time is comprised of a plurality of non-contiguous time slots and wherein the first period of time and the second period of time are selected such that the first test weight vector and the second test weight vector are applied in alternating time slots.

19. (Original) The method according to claim 1 wherein the first period of time and the second period of time are known to the receiving unit.

20. (Original) The method according to claim 1 wherein the modulating signal is a pilot signal, wherein the pilot signal is known by both the receiving unit and the transmitting unit.

21. (Currently Amended) The method according to claim 1 wherein the receiver generates feedback indicating which of the two test weight vectors, first test weight vector $\mathbf{w}_{test1}$ or second test weight vector $\mathbf{w}_{test2}$, generated a ~~the~~ larger received test signal power at the receiving unit.

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22. (Original) The method according to claim 21 wherein the feedback is transmitted from the receiving unit to the transmitting unit as an information bit.

23. (Original) The method according to claim 22 wherein the transmitting unit uses the feedback bit transmitted by the receiving unit to generate a second base test weight vector $\mathbf{w}_{base2}$..

24. (Currently Amended) The method according to claim 23 wherein the transmitting unit uses the feedback bit transmitted by the receiving unit to generate a second base test weight vector $\mathbf{w}_{base2}$ and wherein the second base test weight vector is set to a ~~the~~ value of a ~~the~~ test weight vector selected by the receiving unit, either the first test weight vector $\mathbf{w}_{test1}$ or the second test weight vector $\mathbf{w}_{test2}$.

25. (Original) The method according to claim 10 wherein the transmitting unit uses the feedback bit transmitted by the receiving unit to generate a second base test weight vector $\mathbf{w}_{base2}$ and wherein the second base test weight vector is generated from the first base test weight and the perturbation direction vector as $\mathbf{w}_{base2} = F \frac{\mathbf{w}_{base1} + \beta_1 \mathbf{v}}{\left\| \mathbf{w}_{base1} + \beta_1 \mathbf{v} \right\|}$ if the feedback from the receiving unit indicated that the first test weight vector provided more power to the receiving unit, or is set to be $\mathbf{w}_{base2} = F \frac{\mathbf{w}_{base1} - \beta_1 \mathbf{v}}{\left\| \mathbf{w}_{base1} - \beta_1 \mathbf{v} \right\|}$ if the feedback from the receiving unit indicated that the second test weight vector provided more power to the transmitting unit, where β_1 is a scalar scaling factor and F is a scalar scaling factor.

26. (Original) The method according to claim 23 wherein the second base test vector is used to generate subsequent test vectors applied to the antennae of the transmitting unit.

27. (Currently Amended) The method according to claim 20 wherein the receiver generates feedback indicating which of the two test weight vectors, first test weight vector $\mathbf{w}_{test1}$ or second test weight vector

$\mathbf{w}_{test2}$, generated a ~~the~~ larger received test signal power at the receiving unit and wherein a ~~the~~ decision by the receiving unit as to which test weight vector generated the larger received test signal power at the receiving unit is generated through the steps of

performing a first correlation of a ~~the~~ received waveform with the known pilot signal during the first time period,

performing a second correlation of a ~~the~~ received waveform with the known pilot signal during the second time period, and

selecting the test weight vector which generated the larger correlation magnitude.

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28. (Original) The method according to claim 27 wherein the first and second correlations are generated through the steps of

performing a third correlation of the received waveform with the known pilot signal during both the first time period and the second time period

performing a fourth correlation of the received waveform with a modified version of the known pilot signal, where the known pilot signal is applied positively during the first time period and is applied negatively during the second time period,

obtaining the first correlation as the sum of the third and fourth correlations,

obtaining the second correlation as the difference given by the fourth correlation minus the third correlation.

29. (Original) The method according to claim 28 wherein the third correlation is obtained as a sliding window correlation.

30. (Original) The method according to claim 28 wherein the fourth correlation is obtained as an accumulate and dump correlation.

31. (Original) The method according to claim 1 wherein a data signal is transmitted on the plurality of antennae of the transmitting unit with a first data weight vector $\mathbf{w}_1$.

32. (Currently Amended) The method according to claim 31 wherein the first data weight vector $\mathbf{w}_1$ is generated as a scaled version of a ~~the~~ mean of the first and second test weight vectors, $\mathbf{w}_1 = D(\mathbf{w}_{test1} + \mathbf{w}_{test2})$, where D is a scalar scaling factor.

33. (Original) The method according to claim 6 wherein a data signal is transmitted on the plurality of antennae of the transmitting unit with a first data weight vector $\mathbf{w}_1$ and wherein the first data weight vector $\mathbf{w}_1$ is generated as a scaled version of the first base test vector $\mathbf{w}_{\text{base1}}$, $\mathbf{w}_1 = E\mathbf{w}_{base1}$, where E is a scalar scaling factor.

34. (Original) The method according to claim 29 wherein a data signal is transmitted on the plurality of antennae of the transmitting unit with a first data weight vector $\mathbf{w}_1$ and wherein the third correlation is applied by the receiving unit as a channel estimate to decode the data signal.

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35. (Original) The method according to claim 1 wherein the transmitting unit is simultaneously transmitting to a plurality of receiving units.

36. (Original) The method according to claim 35 wherein the transmitting unit is transmitting test signals, using test weight vectors, to some or all of the plurality of receiving units.

37. (Original) The method according to claim 36 wherein the receiving units to which the test signals are being transmitted use those signals to generate feedback.

38. (Original) The method according to claim 37 wherein the transmitting unit uses the feedback from those plural receiving units which transmit the feedback to adjust weights of the antennae of the transmitting unit, where said weights are maintained independently by the transmitting unit for each receiving unit.

39. (Currently Amended) A method for transmitting signals from a plurality of transmitting units to a receiving unit, each transmitting unit having one or more antennae such that the transmitting units as a group comprise a plurality of antennae, the method comprising the steps of:

in each of the plurality of transmitting units, performing the following steps:

(a) generating a sinusoidal radio carrier corresponding to one of the plurality of antennae;

(b) modulating the sinusoidal radio carrier with a modulating signal;

(c) during a first time period, adjusting ~~the~~ amplitude and phase of the radio carrier signal according to a ~~the~~ magnitude and angle of a first complex number;

(d) creating radio waves by transmitting the radio carrier signal, as adjusted according to the preceding step and as modulated by the modulating signal, from the antenna;

(e) during a second time period that does not overlap with the first time period, adjusting ~~the~~ amplitude and phase of the radio carrier signal according to a ~~the~~ magnitude and angle of a second complex number, that is different from the first complex number;

(f) creating radio waves by transmitting the radio carrier signal, as adjusted according to the preceding step and as modulated by the modulating signal, from the antenna;

(g) generating a third complex number, based upon feedback received from the receiving unit, wherein the third complex number is a function of the first and second complex numbers;

(h) adjusting ~~the~~ amplitude and phase of the plurality of radio carrier signals corresponding to the plurality of antennae according to a ~~the~~ magnitude and angle of a ~~the~~ corresponding element of a ~~the~~ new weight vector;

(i) creating radio waves by transmitting the radio carrier signals, as adjusted according to the preceding step and as modulated by the modulating signal, from the antenna; wherein

each of the plurality of transmitting units have distinct radio carrier signals, modulating signals, first complex numbers and second complex numbers; and

each of the plurality of transmitting units ~~receive~~receives the same feedback from the receiving unit.

40. (Currently Amended) The method according to claim 39 wherein each of the transmitting units comprises at least two antennae, and wherein ~~the~~ first and second complex elements for each transmitting unit are part of ~~a~~ corresponding first and second test ~~vector~~vectors, such that all the first and second test vectors form first and second sets of test weight vectors, $\mathbf{w}_{test1}$ and $\mathbf{w}_{test2}$.

41. (Currently Amended) The method according to claim 40 wherein $\mathbf{w}_{test1}$ and $\mathbf{w}_{test2}$ are generated so that those two constituent vectors that correspond to ~~for~~ a single transmitting unit have the same norm.

42. (Currently Amended) The method according to claim 41 wherein the norm applied to the first and second test weight constituent vectors for each transmitting unit is the 2-norm, such that the summation of the powers of the waveforms generated at the plurality of antennae of any single transmitting unit is the same for the application of both first and second test weight vectors for that transmitting unit.

43. (Original) The method according to claim 40 wherein the test weight vectors for each of the plurality of transmitting units are generated in the same manner and are generated independently.

44. (Original) The method according to claim 39 wherein the first period of time is comprised of a plurality of non-contiguous time slots, and these slots are the same for each transmitting unit.

45. (Original) The method according to claim 39 wherein the second period of time is comprised of a plurality of non-contiguous time slots, and these slots are the same for each transmitting unit.

46. (Original) The method according to claim 39 wherein the first period of time and the second period of time are known to the receiving unit.

47. (Original) The method according to claim 39 wherein the modulating signal is a pilot signal and each transmitting unit has a different pilot signal, wherein each pilot signal is known by both the receiving unit and the transmitting units.

48. (Currently Amended) The method according to claim 40 wherein the receiver generates feedback indicating which of ~~the~~ two sets of test weight vectors, the first set of test weight vectors $\mathbf{w}_{test1}$ or the second set of test weight vectors $\mathbf{w}_{test2}$, generated a ~~the~~ larger received test signal power at the receiving unit.

49. (Original) The method according to claim 48 wherein the feedback is transmitted from the receiving unit to the transmitting units as an information bit.

50. (Currently Amended) The method according to claim 40 wherein the first period of time and the second period of time are known to the receiving unit and wherein the receiver generates feedback indicating which of the two sets of test weight vectors, first set of test weight vectors $\mathbf{w}_{test1}$ or second set of test weight vectors $\mathbf{w}_{test2}$, generated a ~~the~~ larger received test signal power at the receiving unit and wherein a ~~the~~ decision by the receiving unit as to which test weight vector generated the larger received test signal power at the receiving unit is generated through the steps of

performing a first set of correlations of a ~~the~~ received waveform with a ~~the~~ known pilot signal of each of the transmitting units during the first time period, there being one such correlation for each transmitting unit,

forming a first sum of correlations as a ~~the~~ sum of ~~the~~ powers of the first set of correlations,

performing a second set of correlations of a ~~the~~ received waveform with the known pilot signals of each of the transmitting units during the second time period, there being one such correlation for each transmitting unit,

forming a second sum of correlations as a ~~the~~ sum of ~~the~~ powers of the second set of correlations, and selecting the set of test weight vectors which generated the larger sum of correlations.

51. (Original) The method according to claim 49 wherein each of the plurality of transmitting units uses the feedback bit transmitted by the receiving unit to adjust the complex number corresponding to that transmitting unit.

52. (Original) The method according to claim 39 wherein a data signal is transmitted on the plurality of antennae of the plurality of transmitting units with a first set of data weight vectors, with each data weight vector corresponding to one of the plurality of transmitting units.

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53. (Original) The method according to claim 52 wherein the set of first data weight vectors is generated such that the data weight vector of each transmitting unit is a scaled version of the mean of the first and second test weight vectors for that transmitting unit.

54. (Currently Amended) A method for transmitting signals from a plurality of transducers at a transmitting unit to a receiving unit through an unconfined medium, the method comprising the steps of:

(a) generating a plurality of sinusoidal radio carrier signals corresponding to each of the plurality of transducers;

(b) modulating the plurality of sinusoidal radio carrier signals with a modulating signal;

(c) adjusting ~~the~~ amplitude and phase of the plurality of carrier signals corresponding to the plurality of transducers according to a ~~the~~ magnitude and angle of a ~~the~~ corresponding element of a first test weight vector $\mathbf{w}_{test1}$ and a second test weight vector $\mathbf{w}_{test2}$, the first and second test weight vectors comprised of one complex element for each of the plurality of the transducers;

(d) creating waves in the medium by transmitting the plurality of carrier signals, as adjusted according to the preceding step and as modulated by the modulating signal, from the corresponding plurality of transducers;

(e) generating a new weight vector, $\mathbf{w}_{new}$, based upon feedback received from the receiving unit, wherein the new weight vector is a function of the first and second test weight vectors;

(f) adjusting ~~the~~ amplitude and phase of the plurality of modulated carrier signals corresponding to the plurality of transducers according to a ~~the~~ magnitude and angle of a ~~the~~ corresponding element of the new weight vector; wherein

steps (c) and (d) are performed such that a receiving unit in the medium can determine whether the first weight vector or the second weight vector results in a stronger signal transmitted through the medium to the receiving unit.

55. (Currently Amended) A method for receiving signals transmitted from a plurality of antennae at a transmitting unit, the method comprising the steps of:

(a) during a first time period, receiving radio waves transmitted by the plurality of antennae, the radio waves resulting from the transmission by the transmitting unit of a plurality of radio carrier signals, corresponding to the plurality of antenna, whose amplitude and phase were adjusted according to <u>a</u> ~~the~~ magnitude and angle of <u>a</u> ~~the~~ corresponding element of a first test weight vector, $\mathbf{w}_{test1}$, comprised of one complex element for each of the plurality of antennae;

(b) during a second time period that does not overlap with the first time period, receiving radio waves transmitted by the plurality of antennae, the radio waves resulting from ~~the~~ transmission by the transmitting unit of a plurality of radio carrier signals, corresponding to the plurality of antenna, whose amplitude and phase were adjusted according to <u>a</u> ~~the~~ magnitude and angle of <u>a</u> ~~the~~ corresponding element of a second test weight vector, $\mathbf{w}_{test2}$, comprised of one complex element for each of the plurality of antennae, the second test weight vector different than the first test weight vector;

(c) comparing <u>a</u> ~~the~~ power of the radio waves received during the first time period with <u>a</u> ~~the~~ power of the radio waves received during the second time period;

(d) transmitting information indicating whether the power of the radio waves received during the first time period is greater than the power of the radio waves received during the second time period.

56. (Currently Amended) A method for transmitting signals from a plurality of transmitting units to a receiving unit, each transmitting unit having one or more antennae such that the transmitting units as a group comprise a plurality of antennae, the method comprising the steps of:

in each of the plurality of transmitting units, performing the following steps:

(a) generating a sinusoidal radio carrier corresponding to one of the plurality of antennae;

(b) modulating the sinusoidal radio carrier with a modulating signal;

(c) creating radio waves by transmitting the radio carrier signal, as modulated by the modulating signal, from the antenna;

(d)~~(e)~~ receiving a single information bit of feedback from the receiving unit;

(e)~~(h)~~ adjusting ~~the~~ amplitude and phase of a ~~the~~ plurality of radio carrier signals based upon a ~~the~~ value of the single information bit;

(f)~~(i)~~ creating radio waves by transmitting the radio carrier signals, as adjusted according to the preceding step and as modulated by the modulating signal, from the antenna; wherein

each of the plurality of transmitting units have distinct radio carrier signals and modulating signals; and each of the plurality of transmitting units ~~receive~~ receives the same information bit from the receiver.